

SYSTEMIC - PRODUCTION OF BIOBASED FERTILIZERS FROM DIGESTATE: AN IN DEPTH ANALYSIS OF 5 FULL SCALE INSTALLATIONS THROUGHOUT EUROPE

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1. Problem statement

- Production of N and P fertilizers currently relies on non-renewable sources
- Synthetic N fertilizer production (via Haber-Bosch process) uses 1.2% of the world energy consumption¹
- P is identified by the European Commission as a Critical Raw Material whose recycling is becoming essential to reduce dependency on mineral reserves²
- Due to stringent manure application rates on an arable land, manure surplus is currently transported to nutrient deficient regions, leading to higher disposal costs and CO₂ emissions
- In contrast, farmers need to buy synthetic fertilizers in order to meet the NP requirements of crops

2. SYSTEMIC's solution

BIOWASTE AS A RESOURCE FOR MINERAL NUTRIENTS AND ORGANIC FERTILIZER.

At 5 large-scale anaerobic digestion plants, SYSTEMIC implements new approaches for the valorization of biowaste, relying on separation and implementation of innovative recovery technologies.



Groot Zevent Demonstration plant (Baltrum, The Netherlands)

3. Demonstration installations

Name	Capacity and main feedstock	Products
Groot Zevent Vergisting, The Netherlands	100 000 tonnes pig slurry	Biogas, ammonium sulphate, (N) K-concentrates, calcium phosphate, organic soil improvers
AM Power, Belgium	180 000 tonnes manure, food waste	Biogas, N, K-concentrates organic fertilizer
Acqua e Sole, Italy	120 000 tonnes sewage sludge	Biogas, ammonium sulphate organic fertilizers
Oakland, UK	50 000 tonnes poultry litter	Liquefied biogas, liquid CO ₂ , ammonium sulphate, organic fertilizer
Benas (GNS), Germany	80 000 tonnes corn silage, poultry litter	Biogas, ammonium sulphate calcium carbonate, organic fertilizer, cellulosic fibers

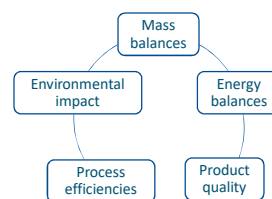
4. Drivers for nutrient recovery at the demonstration plants

- **Groot Zevent:** reduce the cost of digestate disposal by 15 €/t and increase the sustainability of the overall system
- **AM Power:** reduce the cost for digestate disposal
- **Acqua & Sole:** increase ammonia recovery from the digester, reduce nitrogen loss to the environment and produce a high quality digestate that can increase soil organic matter content
- **Oakland:** reduction of odour emissions, production of fibrous materials, mineral nitrogen fertilizer solution and solid phosphate fertilizer
- **Benas (GNS):** increase the ammonia recovery, decrease nitrogen emissions, reduce the amount of digestate for field application and produce fibers

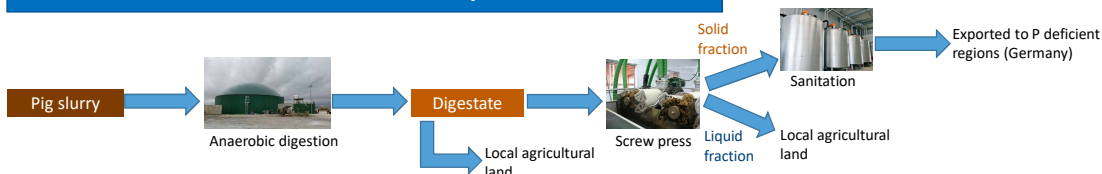
5. Technical innovation at the demonstration plants

Implementation, monitoring and optimization of recovery technologies will include:

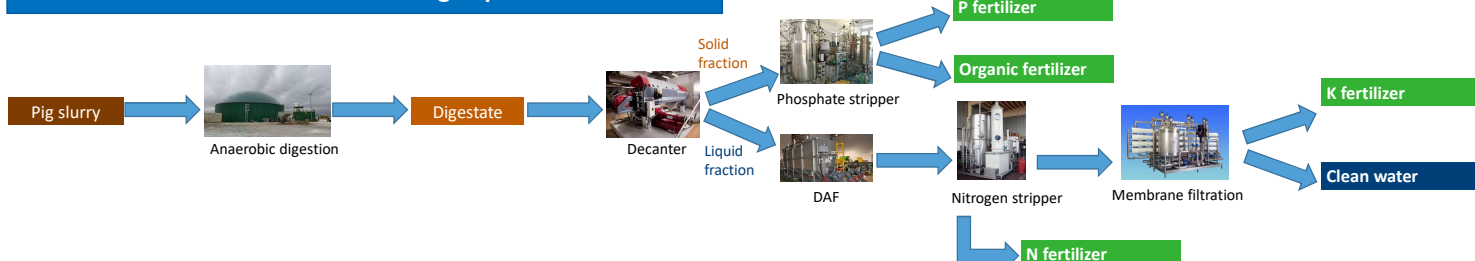
- Setting up Demonstration plants (technical scheme and specifications, building and testing of the installation at full scale)
- Monitoring Demonstration plants (mass and energy balances, demo plants optimization, product monitoring)
- Product composition/quality (performance of field trials) and environmental impact assessment



6. Groot Zevent: current plant



7. Groot Zevent: envisaged plant



References

¹ Worrell et al. (2009). Industrial energy efficiency and climate mitigation. Energy efficiency.

² European Commission, 2010. Critical Raw Materials for the EU. Report of the Ad-hoc Working Group on Defining Critical Raw Materials. European Commission, Enterprise and Industry.